REMARKS

Claims 1-6 and 7-19, as amended, and new claims 20-21 appear in this application for the Examiner's review and consideration.

Claim 1 has been amended to include the recitations of claim 7. New claim 20 is an independent claim combining the features of claims 1, 2, 3 and 7. New claim 21 is an independent claim combining the features of claims 5, 6, 8 and 10. As no new matter has been introduced by the presentation of the amendment and new claims, they all should be entered at this time.

Before addressing the rejections, a brief review of the invention may be helpful. The current trend in the field is to transfer thinner and thinner layers onto a support to obtain composite substrates from which electronic components can be fabricated that can function at faster speeds than existing components. However, experiments have shown that when the thin layer to be transferred is very thin, meaning less than about 100 nanometers, defects appear which do not occur when transferring a thicker layer. Such a very thin layer will not withstand subsequent heat treatments conducted either to strengthen its bonding interface with the support substrate, or to detach it from the source substrate. The heat treatments increase the pressure that exists in gas microbubbles present in the zone of weakness and cause them to degas, resulting in the formation of defects. The very thin transferred layer thus contains many defects such as blisters or may partially delaminate.

Further, it appears that when a very thin layer is transferred onto a support substrate, the quality of the bond obtained is far more sensitive to the presence of particles or hydrocarbons on the surface layers to be bonded than a thicker layer. Similarly, when an intermediate layer is present between the thin layer to be transferred and the support substrate, it has been shown that the thinner the transferred thin layer, the more defects it contains.

The present process achieves better uniformity when processing a thin layer that has been transferred to a substrate. When a relatively thick layer is transferred, i.e., one typically having a thickness of about 300 nanometers, this layer can more easily be thinned to the desired

layer thickness with better uniformity and less defects. In fact, a significantly reduced level of defects is encountered by this process so that a number of unexpected benefits are achieved, in particular with regard to the improved quality of the layer. In addition, the present process reduces the occurrence of blisters at the interface such that a more secure bond is achieved.

Claims 1, 2, 4, 5, 7-14 and 17-19 have been rejected as being anticipated by US patent 6,328,796 to Kub et al. ("Kub") for the reasons set forth on pages 2-4 of the action, while claims 3 and 6 were rejected as being unpatentable over Kub. Applicant traverses the rejection at least as to claim 1 which now incorporates the features of claim 7.

Kub discloses a method for making a multilayered structure with a single crystal film bonded to a polycrystalline substrate has the steps of: bonding a single crystal film to a polycrystalline substrate; and growing an epitaxial layer on said single crystal film bonded to said polycrystalline substrate. In particular, Kub discloses a method for transferring an ultra thin layer from a first substrate to a second substrate. In a first step, an ultra thin layer is formed on a first substrate and then is transferred to the second substrate by hydrogen splitting followed by an etching step. The transferred layer is then used as a seed layer for future epitaxial growth.

In contrast, the present method, as defined by claim 1, is for fabricating a semiconductor structure with an ultrathin layer. This layer is obtained by transferring a thick useful layer onto a support by implanting and splitting followed by reducing the thickness. Kub specifically teaches that this process does not produce good results because the polishing step degrades the Si layer thickness uniformity and makes the process unsuitable for producing very thin Si. (see prior art description of US patent 5,374,564 in the background of Kub). This precaution is stated because Kub failed to recognize the importance of first transferring a thick layer and then thinning it to avoid the very problems noted by Kub. Instead, it is applicants who have discovered the benefits of transferring a layer having a relatively high thickness of at least about 300 nanometers, which layer is then thinned to the desired layer thickness. Accordingly, Kub does not disclose, teach or render obvious the present claims and all rejections based on Kub should be withdrawn.

Claims 1, 2, 4, 5, and 7-19 were rejected over US patent 6,500,732 to Henley for the reasons set forth on page 4 of the action. Again, applicants traverse the rejection at least as to claim 1 which as noted above now incorporates the features of claim 7.

Henley discloses a method of forming substrates. The method includes providing a donor substrate; and forming a cleave layer comprising a cleave plane on the donor substrate. The cleave plane extends from a periphery of the donor substrate through a center region of the substrate. The method also includes forming a device layer on the cleave layer. The method also includes selectively introducing a plurality of particles along the periphery of the cleave plane to form a higher concentration region at the periphery and a lower concentration region in the center region. Selected energy is provided to the donor substrate to initiate a cleaving action at the higher concentration region at the periphery of the cleave plane to cleave the device layer at the cleave plane.

Henley teaches that a cleave layer of around 200 Angstroms can be transferred. This is much smaller than the relatively thick layer of at least about 300 nanometers (or 3000 Angstroms) that is transferred according to the process of present claim 1. Like Kub, Henley does not teach or disclose the benefits of transferring such a thick layer. Accordingly, all rejections based on Henley have been overcome and should be withdrawn.

Claim 15 was rejected over the combination of Kub and Henley. Since neither patent discloses the transfer of a relatively thick layer having a thickness of at least 300 nanometers, the combination of these patents cannot result in the present invention, so that this rejection should also be withdrawn.

Claims 20-21 are similarly patentable over the cited references. Claim 20 recites that a relatively thick layer having a thickness of at least 300 nanometers is transferred, and also recites that an intermediate layer having a thickness that is equal or less than about 50 nanometers is provided on the support substrate or on the source substrate before the bonding step such that, after the detaching step, an alternate intermediate structure is obtained that includes the support substrate, the intermediate layer and the useful layer. The combination of these features is not disclosed by Kub or Henley. Claim 21 recites a process similar to that of

claim 1 except that instead of reciting a minimum thickness for the useful layer, a ratio is recited such that the useful layer is at least three times thicker than the ultrathin layer before treatment, and the ultrathin layer is equal to or less than about 100 nanometers thick following the treating step. In addition, claim 21 recites that the intermediate layer is made of a material of at least one of silicon oxide, silicon nitride, a high permittivity insulating material, diamond, or a combinations of the materials. Again, this combination of these features is not disclosed by Kub or Henley.

In view of the above, it is believed that claims 1-6 and 8-21 are in condition for allowance, early notice of which would be appreciated. Should the Examiner not agree, then a telephonic or personal interview is respectfully requested to discuss any remaining issues and expedite the eventual allowance of the claims.

Respectfully submitted,

8/17/05
Date

Allan A. Fanucci
Allan A. Fanucci, Reg. No. 30,256

WINSTON & STRAWN LLP
Customer No. 28765
212-294-3311